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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/674,703	09/30/2003	David L. O'Meara	FKL-002	4557

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EXAMINER	
GEORGE, PATRICIA ANN	

ART UNIT	PAPER NUMBER
1794	

NOTIFICATION DATE	DELIVERY MODE
07/11/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/674,703	O'MEARA ET AL.	
	Examiner	Art Unit	
	Patricia A. George	1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 April 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,5-18,20,21,23,24 and 30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 5-18, 20-21, 23-24, and 30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.
>
> This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1 and 5-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over McGahay et al.

The reference of Tao is relied on as evidence.

McGahay teaches a method of monitoring the erosion product of a marker element (10) on the SiO2 (i.e. quartz) chamber wall. McGahay teaches that the system component has a marker material deposited thereon (see col. 1, line 34 and col 3., lines 12-19), **as in claim 5**, and is in a process chamber (i.e. system) for processing semiconductor substrates. McGahay teaches the marker can be benifitial when there is a need to differentiate between the film deposited and the chamber wall (i.e. when they are the same). McGay teaches the use of a TEOS material for the marker, but also that the monitoring of other elements, films, or compositions may be analyzed. See column 5, lines 22-30.

McGahay teaches that the TEOS containing marker element is exposed to a cleaning gas (18) (i.e. reactant gas) which is used for a chamber cleaning process, **as in claim 7**, to form an emission (i.e. erosion) product during the process. Since TEOS (known as SiO2 in the semiconductor industry) and quartz (i.e. SiO2) are both known to erode oxygen, the monitoring of erosion products of the TEOS marker intrinsically provides monitoring of the erosion product of the quartz system component (i.e. reads on monitoring the processing system for the release of the erosion product during the process).

Although McGahay teaches that the monitoring of the erosion products of the marker, Mcgahay is silent as to the monitoring of the specific erosion product of oxygen.

It would have been obvious to one of ordinary skill in the art at the time the invention was made, to modify the invention of methods of monitoring the erosion products of TEOS, as McGahay, to include the monitoring of every known erosion product, such as oxygen, because oxygen is known to be an erosion product of TEOS, McGahay teaches to monitor the erosion products of the marker, and further McGahay teaches other elements, and compositions than those provided in examples can also be analysed.

McGahay teaches that the processing system is monitored with the use of an optical emission spectroscopy (OES) for the release of the erosion (20) of the marker element (i.e erosion product); and the flow of the cleaning gas (22) is terminated (i.e stopping the process) when a change to the emission of the marker is present in the

exhaust gas (release of the removed deposited material i.e. erosion product monitored at a threshold value). See figure 1 and col. 4, lines 32-44.

McGahay does not explicitly teach emissions are erosion products, as in **claim 1**.

It would have been obvious to one of ordinary skill in the art at the time the invention was made, to modify the method of monitoring a marker element, of McGahay, to include the emissions monitored are erosion products, as applicants specifically claim, because one skilled in the art would understand a removal process would also be an erosion process and therefor the byproduct of such a removal process would be an erosion product.

McGahay is not explicit about the monitoring of the erosion product of the system component material.

It would have been obvious to one of ordinary skill in the art at the time the invention was made, to modify the invention of eliminating overetching of the chamber walls, as McGahay, to monitor the emission (i.e. erosion) of any erosion product that would determine overetching of the system component, including the applicants' claimed erosion product of the system component material itself, because McGahay teaches other elements, different from those presented as specific example may be monitored, which provides one of skill with a reasonable expectation of success in monitoring all emission products in the chamber, including those claimed by the applicants. Furthermore, such a teaching by McGahay infers to one of skill that the monitoring of any erosion product that will stop the overetching of the system parts,

including the monitoring of erosions of the system component itself, would be suitable for the intended purpose of overcoming the problem presented.. See MPEP 2144.01

As for **claim 6**, McGahay fails to teach applicants' specifically claimed materials.

McGahay teaches that one skilled in the art would have the skill to recognize a change in varied materials.

It would have been obvious to one of ordinary skill in the art at the time the invention was made, to modify the method of monitoring a marker element, of McGahay, to include any materials an optical emission spectroscopy would be able to monitor erosion products of, such as applicants' specifically claimed Si, because Tao provides evidence that an OES is effective for monitoring Si (see col. 12, lines 16-19), and McGahay teaches that one skilled in the art would have the ability to recognize varied materials.

All the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded predictable results to one of ordinary skill in the art at the time of the invention. The prior art included each element claimed although not necessarily in a single reference, and one of ordinary skill in the art could have combined the elements as claimed by known monitoring methods, and in combination, each element merely would have performed the same function as it did separately, and one of ordinary skill in the art would have recognized that the results

of the combination were predictable. Further, a predictable use of prior art elements according to their established functions to achieve a predictable result is prima facie obvious. See KSR Int'l Inc. v. Teleflex Inc., 127 S Ct. 1727, 1741, 82 USPQ2d 1385, 1396 (2007).

With respect for **claims 8-9**, the cleaning gas contains NF3. See col.3, lines 60-65.

Claim Rejections - 35 USC § 103

Claims 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over McGahay, as applied to claims 1 and 5-9 above, further in view of Chow et al.

The reference of Tao is relied on as evidence.

With respect for claims 10-11, McGahay teaches conditioning the system. See col. 3, lines 7-9.

McGahay is silent as to the gases used for conditioning, as applicants' claims 10-11, and silent to the use of HF as an etchant as in claim 13.

Chow teaches the use of the reactant gas containing silicon (col. 13, l. 55-60), or NH3 (col. 9, l. 11, and 26-30), used for conditioning the chamber (col. 12. L. 13-17), and use of HF (col. 8, l. 51) for etching a substrate (col. 8, l. 49) during a substrate etching process.

As for **claim 10**, Chow teaches the exposing comprises the reactant gas containing at least one of a silicon-containing gas (col. 13, l. 55-60) for conditioning the system component during a chamber conditioning process (col. 12. L. 13-17).

As for **claim 11**, Chow teaches the exposing comprises the reactant gas containing at least one of dichlorosilane and NH3 (col. 9, l. 11, and 26-30) for conditioning the system component during a chamber conditioning process.

It would have been obvious to one of ordinary skill in the art at the time the invention was made, to modify the method of monitoring a marker element, of McGahay, to include use of dichlorosilane or a nitrogen containing gas for conditioning the system because Chow teaches that as the cleaning process conditions the chamber it creates the byproduct of a passivation layer.

As for **claims 12 and 13**, Chow teaches that the exposing comprises the reactant halogen containing gas, HF (col. 8, l. 51), for etching a substrate (col. 8, l. 49) during a substrate etching process.

Claim Rejections - 35 USC § 103

Claims 14-17, 20-21, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over McGahay, as applied to claims 1 and 5-9 above, further in view of Tsai.

The reference of Tao is relied on as evidence.

McGahay teaches that the exposing of the system component comprise deposition of a film on a work piece (i.e. depositing a film during a substrate film formation process). See Abstract.

McGahay is silent as to the applicants' specifically claimed process parameters.

As for **claim 14**, Tsai teaches that the reactant gas containing at least one of a silicon-containing gas (col. 10, l. 63) and a nitrogen-containing gas for depositing a film (col. 10, l. 3) during a substrate film formation process (col. 12, l. 3).

As for **claim 15**, Tsai teaches that the reactant gas containing tetraethyl orthosilicate (TEOS) (col. 15, l. 7-15) for depositing a film during a substrate film formation process.

As for **claim 16**, Tsai teaches that during a thermal deposition process, a hot liquid is circulated through the chamber walls to maintain the chamber at elevated temperatures (col. 11, l. 46-49).

As for **claim 17**, Tsai teaches to operate the processing system at a chamber pressure of 20 Torr, which is encompassed by the claimed range of between 10 mTorr and about 760 Torr during the exposing (col. 7, l. 33).

As for **claim 20**, Tsai teaches the monitoring comprises using an optical monitoring system to detect light absorption of the erosion product (col. 5, l. 61-63).

As for **claim 21**, Tsai teaches the monitoring further comprises determining if the intensity level of the light absorption (col. 9, l. 54-58) has reached a threshold value (col. 9, l. 55-56 describes the transistor may be tailored which is written on the limitations of a desired threshold value).

It would have been obvious to one of ordinary skill in the art at the time the invention was made, to modify the method of monitoring a marker element, of McGahay, to include any process parameters, including those claimed by applicants, because Tsai teaches that such process parameters are known, and one in the art

would have the skill to determine relevant process parameters through routine experimentation in the absence of a showing of criticality

As for **claim 30**, Tsai teaches all the elements of monitoring the release of halide species erosion products, such as silicon halide and silicon oxyhalide of claims 29 and 30. Tsai teaches the deposition of silicon and silicon oxide (col. 3, l. 37 and 41) in the process chamber (col. 3, l. 32), the presence of halide ion (claim 8) which are contributed by etchants which are free fluorine radicals, NF3 (col. 3, l. 50), then by conversion of gas to dissociated species (col. 3, l. 47-49), are monitored (claim 43) as a halide species erosion product. Because the chemistry of halide species erosion products are present and monitored, halide species erosion products such as silicon halide and silicon oxyhalide exist.

Claim Rejections - 35 USC § 103

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over McGahay, as applied to claims 1 and 5-9 above, further in view Kim et al.

The reference of Tao is relied on as evidence.

McGahay teaches the use of quartz system components (see discussion of claim 2), but fails to disclose the process parameters as in claim 18.

Kim discloses the chamber operates at 200 mTorr to about 760 Torr (col. 7, l. 38), at the temperature of 200 to 800.degree C. (col. 7, l. 39-40), as defined by **claim 18**.

It would have been obvious to one of ordinary skill in the art at the time the invention was made, to modify the method of monitoring a marker element, of McGahay, to include any process parameters, including those claimed by applicants, because Kim teaches such process parameters are known, and one in the art would have the skill to determine relevant process parameters through routine experimentation in the absence of a showing of criticality.

Claim Rejections - 35 USC § 103

Claims 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over McGahay, as applied to claims 1 and 5-9 above, further in view of Nakata.

The reference of Tao is relied on as evidence.

McGahay is silent as to the components of the monitoring spectroscopy system using a gas mass sensor, as in claims 23-24.

As for **claim 23-24**, Nakata teaches to monitor by spectroscopy, using a mass sensor to detect a mass signal from the erosion product (col. 1, l. 37-42), and determining if an intensity level has reached a threshold value (col. 6, l. 27-29), which is written on the limitation "mass signal".

It would have been obvious to one of ordinary skill in the art at the time the invention was made, to modify the method of monitoring a marker element, of McGahay, to include how the spectroscopy functions, including the functions claimed by applicants, because McGahay teaches that it is known for spectroscopy to function in the same manner, and one in the art would have the skill to determine such relevant

details of spectroscopy through routine familiarity of the monitoring system in the absence of a showing of criticality.

Response to Arguments

The applicants argue, on pages 2-3, that the prior art of McGahay monitors emissions from materials other than the quartz system component material. The Examiner agrees.

The examiner does not agree with the applicants that the reference of McGahay has been overcome because the reference of McGahay also teaches to monitor other elements, films, and compositions. Further, because the reference of McGahay teaches the monitoring of elements that are different from those presented as specific examples provided, it would be obvious to include the monitoring of the system component material because it is another material. See column 5, lines 23-30. Although McGahay, is not explicit about the monitoring of the erosion product of the system component material, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to modify the invention of eliminating overetching of the chamber walls, as McGahay, to monitor the emission (i.e. erosion) of any erosion product that would determine overetching of the system component, including applicants' claimed erosion product of the system component material itself, because McGahay teaches monitoring other elements, different from those presented as specific examples may be monitored, which provides one of skill with a reasonable expectation of success in monitoring all emission products in the chamber, including

those claimed by the applicants. Furthermore, such a teaching by McGahay infers to one of skill that the monitoring of any erosion product that will stop the overetching of the system parts, including the monitoring of erosions of the system component itself, would be suitable for the intended purpose of overcoming the problem presented.. See MPEP 2144.01

Further still, the reference of McGahay teaches monitoring the erosion product of a TEOS marker on a quartz chamber wall. As TEOS (SiO2) will erode oxygen, and quartz (SiO2) will also erode oxygen, the monitoring of erosion product of the marker include the monitoring of the erosion products of the system component material. It would have been obvious to one of ordinary skill in the art at the time the invention was made, to modify the invention of methods of monitoring the erosion products of TEOS, as McGahay, to include the monitoring of every known erosion product, such as oxygen, because oxygen is known to be an erosion product of TEOS, McGahay teaches to monitor the erosion products of the marker, and further McGahay teaches other elements, and compositions than those provided in the examples can also be analysed.

Finally, such a teaching by McGahay infers to one of skill that any indication of overetching the system component including monitor erosions of the system component itself, would provide one of skill with feedback that would resolve the problem of over-etching.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patricia A. George whose telephone number is (571) 272-5955. The examiner can normally be reached on Tue. - Fri. between 9:00 am and 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Keith Hendricks can be reached on (571) 272-1401. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Patricia A George
Examiner
Art Unit 1794

/Patricia A George/
Examiner, Art Unit 1794

/KEITH D. HENDRICKS/
Supervisory Patent Examiner, Art Unit 1794

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	10/674,703	O'MEARA ET AL.	
	Examiner	Art Unit	
	Patricia A. George	1794	